

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of  
Inventor(s): Satgurunathan et al ) Group Art Unit: 1763  
Appln. No. 583,266 ) Examiner: Aaron J. Greso  
Filed: 14 Dec. 2004 )  
Title: STAIN RESISTANT URETHANE VINYL AQUEOUS COATING COMPOSITIONS

SUPPLEMENTAL DECLARATION OF R. SATGURUNATHAN

Commissioner of Patents  
U.S. Patent and Trademark Office  
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Sir:

I, Rajasingham Satgurunathan of the Netherlands, do HEREBY SOLEMNLY AND SINCERELY  
DECLARE AS FOLLOWS:

1. I am a Science Manager at DSM NeoResins Inc. with a PhD in Polymer Chemistry.
2. I am a co-inventor of both: i) GB 2362377; and ii) U.S. Patent Appln. No. 10/583,266.
3. I have read and understood the specification of US Patent Application No 10/583,266, GB 2362377 and WO 93/24551. I understand that the Examiner has raised GB 2362377 and WO 93/24551 as being of relevance to said U.S. Patent Appln. No. 10/583,266.
4. This declaration is to clearly identify that the polyurethanes described and exemplified in GB 2362377 and WO 93/24551, have a lower content of carbon C, nitrogen N and halogen H based on vinyl monomer molecular weight than polyurethane A claimed in said U.S. Patent Appln. No. 10/583,266 and therefore do not fall within the scope of the polyurethane A. The impact of the C+N+X content in the polyurethane upon the coating composition comprising it is also proven in the ethanol stain resistance and moisture vapour transmission rate (MVTR) values submitted with this declaration.

U.S. Patent Appln. No. 10/583,266 relates to an aqueous coating composition comprising 20 to 80 wt% of a polyurethane A comprising polyols (a)(3) to (a)(5)

according to claim 1 which have a total ring structure content  $\geq$  48 wt%; and 80 to 20 wt% of a vinyl polymer B with a  $T_g \geq 20$  °C which comprises > 70 wt% carbon (C), nitrogen (N) and halogen (X) based on vinyl monomer molecular weight, which composition when in form of a film exhibits a moisture vapour transmission rate MVTR  $\leq 500$  g/m<sup>2</sup>/24 h.

The moisture vapour transmission rate MVTR was defined under paragraph [0132] and determined according to ASTM D1653-91a described under [0168]-[0171] and Table 7, MVTR value is indicative of the defect free nature and coherency of the coating, which reflects on the barrier (water / stain) performance of the coating. The stain resistance was defined under paragraph [0133] and determined according to the method DIN 68,861, Pt 1B described under [0180] - [182] and Tables 12 and 13. The C+N+X content was determined by calculation based on vinyl monomer molecular weight, as described in paragraph [0085] in U.S. Patent Appln. No. 10/583,266.

Under my supervision the C+N+X content of the examples of WO 93/24551 and GB 2362377 were calculated.

The examples of GB 2362377 contain the following vinyl polymers:

- AP1 ( $T_g = 80$  °C): C+X+N = 61.9%
- AP2 ( $T_g = 5$  °C): C+X+N = 65.7%
- AP3 ( $T_g = 40.6$  °C): C+X+N = 63.8%
- AP4 and AP5 are sequential polymers based on the compositions of AP1 and AP2.

Therefore, in the examples of GB 2362377 only polymers AP1 and AP3 are vinyl polymers having a  $T_g > 20$  °C, according to polymer B of U.S. Patent Appln. No. 10/583,266. However, AP1 and AP3 have the C+N+X content well below 70 wt% based on vinyl monomer molecular weight.

All the examples of WO 93/24551 comprise polyurethane compositions having C+N+X content of 62.2 % based on vinyl monomer molecular weight, again well below 70 wt% based on vinyl monomer molecular weight.

Under my supervision additional experiments were prepared and the stain resistance and MVTR were measured in accordance with the described experimental methods from U.S. Patent Appln. No. 10/570,163.

A new comparative polyurethane-vinyl polymer composition (CE3) was prepared on the basis of example E1 of U.S. Patent Appln. No. 10/583,266. This was done to be able to compare the influence of the C+X+N% value over the MVTR and stain resistance characteristics. The composition of CE3 had the same urethane backbone as in example

E1 (see Table 1), only the vinyl polymer was designed to have a different monomer composition: styrene and 2-EHA monomers forming the vinyl polymer were replaced with 73,83 g butyl acrylate (BA) and 123,05 g methyl methacrylate (MMA), resulting in the same overall Tg of the vinyl polymer as in example E1, of 30 °C. The C+N+X% value of CE3 was of 62.1% (i.e. close to the value of the examples from WO 93/24551 and AP1 and AP3 from GB 2362377).

The effect of the C+N+X content is visible in Table 1 below on the MVTR value and stain resistance against ethanol determined after 1h and 16 hours (rating from 1 to 5, where 1 is poor and 5 is excellent):

Table 1

	Clear formulations	
	CE3	E1
% solvent mix	8	8
% C+N+X	62.1	90
MVTR (g/m <sup>2</sup> /24 h)	516	463
<b>Stain resistance</b>		
Demiwater 16 h	5	5
Ethanol 48% 16 h	2	3-4
Coffee 16 h	5	5
Coffee 1 h	5	5
Hot pan 1 h	5	3
Ethanol 48% 1 h	2-3	4-5
Mustard 5 h	5	5
Red wine 5 h	5	5
Tota	34.5	36

Clearly, the comparative example CE3 having a lower C+N+X content, which closely corresponds to that of examples in WO 93/24551 and GB 2362377, has a poor ethanol resistance and an MVTR value above 500 g/m<sup>2</sup>/24 h as compared to the composition according to example E1 in which the vinyl polymer had a C+N+X content > 70%.

Therefore, I believe the coating compositions described in GB 2362377 or WO 93/24551, when in the form of a film, do not inherently possess the good MVTR and ethanol stain resistance characteristics of the coatings in U.S. Patent Appln. No. 10/570,163.

5. I DECLARE that all statements made of my own knowledge are true and that all statements made on information and belief are conscientiously believed to be true, and further that these statements were made with the knowledge that wilful false statements and the like so made are punishable by fine or imprisonment or both (18USC 1001) and may jeopardize the validity of this patent application or any patent issuing thereon.

And I make this solemn declaration,  
DECLARED at Waalwijk, The Netherlands this day 28th of March 2011.

Rajasingham Satgurunathan